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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,877	03/15/2004	Si-Bum Kim	123037-05005048	8351
23429 7590 02/14/2008 LOWE HAUPTMAN HAM & BERNER, LLP 1700 DIAGONAL ROAD SUITE 300 ALEXANDRIA, VA 22314				
EXAMINER TRINH, MICHAEL MANTH				
ART UNIT 2822		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/799,877

Applicant(s)

KIM, SI-BUM

Examiner

Michael Trinh

Art Unit

2822

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2, 3 and 5-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3 and 8-21 is/are allowed.
- 6) ☒ Claim(s) 2 and 5-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/S5108)
Paper No(s)/Mail Date 11/14/2007.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application.
- 6) ☐ Other: _____.

DETAILED ACTION

*** This office action is in response to Applicant's RCE and IDS filed November 14, 2007. Claims 2-3,5-21 are pending.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

1. Claims 2,5 are rejected under 35 U.S.C. 102(e) as being anticipated by Allman et al (6,524,926).

Re claim 2, Allman teaches a method for forming a semiconductor device comprising: forming an insulation layer 112 in a capacitor region and a metal interconnection region on a substrate 115 (Fig 2; col 4, lines 55-67; col 5-7); forming a first trench (Fig 5-6,10-12) in the insulation layer 112 at the capacitor region and the metal interconnection region; forming the first metal interconnection (160/132 in Figs 6-7; 132/178 in Figs 10-12,14-15; col 9, lines 5-20) inside the first trench; forming a second trench (Figs 7, col 7, lines 6-28; Figs 10-12,14-15, cols 8-13) by removing the insulation layer 112 between the first metal interconnection; and forming a capacitor in the second trench (Figs 8-9,10,11,12), wherein as shown in Figure 11, the capacitor is formed in the second trench (col 9, lines 20-49); and forming a second metal interconnection (e.g. 136,184,186,138 in Figs 10-12) over the first metal interconnection; wherein as shown in Figures 12,11,10, the capacitor and the first metal interconnection are formed in substantially equivalent vertical plane of the semiconductor device, wherein, as further taught by Allman at column 9, lines 48-50, the metal liner 190 can be used in each of the other embodiments shown in Figures 1,10, and 12-14; and wherein the configuration as shown in Figure 12 for the alternative capacitor 196 can be used with the other embodiments shown in Figures 1,10,11 and 14 (col 10, lines 35-37), so that the capacitor and the first metal interconnection are formed in substantially equivalent vertical plane (Figures 10-12). Re claim 5, wherein the first metal interconnection includes copper (col 6, lines 37-39, 32-59).

Claim Rejections - 35 USC § 103

2. Claim 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allman et al (6,524,926) taken with Vaartstra et al (6,445,023).

Allman teaches a method for forming a semiconductor device as applied to claims 2,5 above. Re claims 6-7, Allman teaches forming the capacitor including a first electrode 190, a capacitor dielectric 1146, and a second electrode 148 (Figs 11,9-14; col 9, line 20 to col 10).

Re claim 6, Allman thus does not mention first and second electrodes including Pt, Ru, Ir, or W. Re claim 7, Allman does not mention the capacitor dielectric comprising an oxide such as tantalum oxide or strontium titanate.

However, re claim 6, Vaartstra teaches (at col 7, lines 40-50; col 8, lines 1-19; col 6, lines 27-57) forming the first and second electrodes 152,156 by employing a conductive material including Pt, Ru, Ir. Re claim 7, Vaartstra also teaches (col 7, lines 57-67) forming the capacitor dielectric by employing a high-k dielectric material including tantalum oxide, strontium titanate, and barium titanate, etc.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the first and second capacitor electrodes of Allman by employing the conductive materials including Pt, Ru, and Ir as taught by Vaartstra, because these conductive materials are alternative and art recognized equivalent conductive materials for forming the electrodes, wherein Pt, Ru, and Ir are materials having high electrical conductivity. Also, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the capacitor dielectric of Allman by employing an oxide dielectric material including tantalum oxide, strontium titanate, barium titanate, as taught by Vaartstra. This is because of the desirability to form the capacitor oxide dielectric having high-k dielectric constant, thereby improving the capacitance of the capacitor.

Allowable Subject Matter

3. Claims 3,8-21 are allowed for the same reason as already of record.

Response to Amendment

Applicant's IDS communication filed 11/14/2007 with respect to pending claim have been considered. The indicated allowability of claims 2,5-7 is withdrawn in view of the newly discovered reference(s) to Allman et al (6,524,926). Rejections based on the newly cited reference(s) as above.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 9:00 Am to 5:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).
Oacs-18

/Michael Trinh/

Primary Examiner, Art Unit 2822